APPENDIX.

Brief History of the Past Litigation of This Patent.

The Summary Statement of Matter Involved stated that there have already been eleven major decisions in the litigation of the patent here at issue, and that the claims here involved have been held valid and invalid as well as infringed and not infringed by devices that are patentwise identical to those of respondent.

The first decision was that of Judge Harrison in *Leishman v. Associated Wholesale Electric Company,* 36 Fed. Supp. 804. In that case, as here, the accused devices were operated by plungers, and the court correctly said (p. 806):

> ". . . it cannot be seriously denied that the accused device uses a rotatable rocker, adjustable tappet and when brought to rest the two parts are coaxial—the essential elements contained in the plaintiff's structure."

A few paragraphs later in the decision, Judge Harrison reiterated:

> ". . . as I have stated before, it contained plaintiff's [Leishman's] combination, . . ."

But he held there was no invention in petitioner's coaxial tappet and rocker combination because (36 Fed. Supp. 804, at 808):

> "The importance of the mechanical relationship is well known in the art and a feature that must be considered in all machine designing *when you desire parts to move together harmoniously* and free from friction. . . . It is a mechanical principle that is hundreds of years old." (Emphasis supplied.)

The appellate court in the *instant* case has made it very clear that the purpose of the coaxial relationship in petitioner's combination is *exactly opposite* from what Judge Harrison said was old, and that its purpose here is to *prevent* absolutely *all* rotation of the rocker during the adjusting process, and that *any* movement would be fatal to a proper setting. Properly viewed, the old uses of coaxiality tended to show that petitioner's use was unorthodox and inventive.

The second opinion in this protracted litigation (128 F. 2d 204) was rendered by the Court of Appeals for the Ninth Circuit when Judge Harrison's decision came up on appeal. The three judges *unanimously* ruled that the appeal had been filed *too late.*

The *third* opinion was rendered by this Honorable Supreme Court (318 U. S. 203). All nine justices unanimously held that the said appeal had been filed *on time* and that the reasoning of the appellate court was "artificial and untenable."

In the *fourth* opinion (137 F. 2d 722), the Court of Appeals acted upon the appeal from Judge Harrison's decision in the *Associated* case. Although Judge Harrison formally ruled only on the issue of invention, the appellate court formally ruled only on the issue of infringement. Judge Harrison had stated unequivocally that the accused tuners "contained plaintiff's combination," but the appellate court freed the accused devices because they were operated by plungers instead of levers as pictured in the illustrative embodiment shown in the patent drawings.

None of the claims, however, called for levers—in fact, two of the claims did not even include an operating member of any kind. As to Judge Harrison's holding of invalidity, the appellate court stated (137 F. 2d 722, 727, 728):

> "* * * The judgment declares that the claims 'are invalid for want of invention.' In the view we take, the declaration is unnecessary. As to its correctness or incorrectness, we express no opinion.
>
> "The judgment is modified by striking therefrom the above quoted declaration and, as thus modified, is affirmed."

The *fifth* decision was that of the District Court for the Western District of Oklahoma in *Leishman v. The Richards and Conover Company,* Civil Action No. 2155, involving tuners manufactured by General Instrument Corporation and Radio Condenser Company. These tuners were in all pertinent respects the same as those accused in the *Associated* case, *supra,* as well as those in the instant action. Judge Chandler exhibited an excellent understanding of mechanical and patent matters. He operated and discussed the various models and even cross-examined the witnesses extensively. He held the claims "clearly valid and clearly infringed." This decision, following that in which the Court of Appeals for the Ninth Circuit had wiped out Judge Harrison's holding that the claims were invalid for want of invention, strongly reinforced the presumption of validity.

The *sixth* decision was rendered by the United States District Court for the Southern District of California in the case of *Radio Condenser Company and General Instrument Corporation v. Leishman,* unreported. This was a Declaratory Judgment action in which the manufacturers of the tuners held to infringe in *The Richards and Conover* case, *supra,* asked the California court to hold that they did *not* infringe. The lower court, bound by the decision of its appellate court in the *Associated* case, *supra,* granted a summary judgment that these tuners were *not* infringments because they were operated by plungers.

The *seventh* decision was that of the Court of Appeals for the Ninth Circuit in *Leishman v. Radio Condenser Company and General Instrument Corporation,* 167 F. 2d 890. This was the appeal from the District Court's summary judgment of non-infringment. Numerous exhibits were in the record to show that plungers and levers had long been used as equivalents for operating automatic tuners and that they were probably the most commonly encountered of all mechanical equivalents. But the appellate court affirmed the lower court and reaffirmed its own decision in the *Associated* case holding that infringement of petitioner's combination could be avoided by substituting a plunger for the lever as an operating member. In reaffirming its old decision in the *Associated* case, the appellate court (p. 892 of the opinion) said: "Our decision has not been reversed or overruled. The California court was not at liberty to overrule it. We could overrule it

if we thought it was wrong, but, after reconsidering it, we think it was right and now reaffirm it."

The *eighth* decision was that of the Court of Appeals for the Tenth Circuit in *The Richards and Conover Co. v. Leishman,* 172 F. 2d 365. In this opinion the Court of Appeals for the Tenth Circuit manifestly paid little attention to the evidence and to the findings of the trial court but was governed primarily by Judge Harrison's decision in the *Associated* case, *supra.* The appellate court even uncritically copied the same rather obvious errors. Although the first part of the appellate court's opinion recognized that the purpose of the coaxial relationship was to *prevent* unwarranted movement at the time of adjustment, the latter part of the opinion overlooked this important fact, and the reason given for a holding of non-invention was a rephrasing of Judge Harrison's statement regarding the old conventional uses of coaxiality to *facilitate* rotation, thus:

> "The principle of coaxial relationship and its importance *where it is desired that two parts of a machine operate together harmoniously,* has been within the knowledge, for many years, of ordinary mechanics skilled in the art." (172 F. 2d 365 at 369.)

The court held the claims invalid because of this clearly irrelevant fact.

But the court nevertheless stated that the claims did not call for a lever and it went out of its way to show that it disagreed with the two decisions of the Court of Appeals for the Ninth Circuit in its holdings that the claims here at issue could be avoided by operating petitioner's combination by means of a plunger.

Petitioner asked for a rehearing on the issue of validity, pointing out that petitioner's use of a coaxial relationship *to prevent* movement was diametrically opposite to the court's cited old use of a coaxial relationship "where it is desired that two parts of a machine operate together harmoniously." The court granted the rehearing and then rendered the *ninth* decision in this total series, this decision after rehearing being published in the Federal Reporter along with the court's original decision. The later decision included a purported mathematical analysis of the reasons for creeping. This analysis was intended to show how the court thought a skilled mechanic would arrive at a coaxial relationship as a means of *preventing* the movement of the tappet and rocker. This analysis had no basis in the record, nor did the court so contend. The court based its conclusions largely upon a comparison of dimensions in its own grossly inaccurate drawings; upon the position of the apex of a triangle with respect to an admittedly imaginary line, the triangle purporting to represent Marschalk's tappet, which had no apex; and upon ideas of forces and lever arms totally at variance with elementary principles of physics as taught even in high schools. But even if the court's *sui sponte* sojourn into

the field of an expert witness had led to a correct analysis of the reasons for creeping, such an analysis still would have been of no moment—because the record showed that numerous engineers had been faced with the problem, and none but Leishman was able to provide the solution.

The *tenth* decision [R. 41 *et seq.*] was rendered by the trial court in the instant case. Although the trial was held months before the Court of Appeals for the Tenth Circuit rendered its two decision in *The Richards and Conover* case, *supra,* the lower court stated it was not going to render its opinion herein until it learned the outcome of the appeal in the Tenth Circuit. [R. 185-186.] In line with this advance indication, the lower court based its holding of non-invention primarily upon the decision of the appellate court in *The Richards and Conover* case.

Petitioner asked for a rehearing of the lower court's decision herein, pointing out that since the analysis of the Court of Appeals for the Tenth Circuit had no basis in the expert testimony in that case and was rendered subsequent to the trial of the instant case, petitioner consequently had had no opportunity to introduce expert testimony anywhere to show the errors in the said appellate court's own self-offered expert testimony. The motion for a rehearing in the lower court was supported by affidavits from the *head* of the department of mechanical engineering at the University of California [R. 78], the *head* of the department of mechanical engineering at the California Institute of Technology [R. 71], and the *head* of the department of engineering research at the Univer-

sity of California at Los Angeles [R. 75].[3] The requested rehearing was denied.

The *eleventh* opinion is the one rendered by the Court of Appeals for the Ninth Circuit in the instant case. The reasons why this decision should be reviewed are of course presented in the Reasons Relied Upon for the Allowance of the Writ. Suffice it to say here that the court nowhere indicates that it agrees with the analysis made by the Court of Appeals for the Tenth Circuit. Each court that has rendered a decision of non-invention has gone outside the expert testimony for a theory to support its own independent view.

Respondent's brief before the appellate court says (p. 5 thereof): "In spite of the complicated litigious history of the patent in suit, the issue on this appeal is not complicated." How true of the issues before each of the courts! All the accused devices have been patentwise the same. Four of the claims call for only three elements and the other for only four, and none of them calls for a lever. But "the complicated litigious history" shows what a tangled web the courts can weave when they try to reconcile or rationalize previous opinions instead of getting down to the simple evidence before them.

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[3]The fact that these outstanding authorities are the heads of these departments in their respective universities, is not apparent from the opinion here sought to be reviewed, as the opinion refers to the first two merely as professors in their respective departments and to the latter merely as an *expert* in engineering research at the University of California at Los Angeles. [R. 1199.]

IN THE

Supreme Court of the United States

October Term, 1951.

No.....

LEROY J. LEISHMAN,

Petitioner,

vs.

GENERAL MOTORS CORPORATION,

Respondent.

BRIEF IN SUPPORT OF PETITION FOR WRIT OF CERTIORARI.

A. Introduction.

In order that there may be no misunderstanding as to the nature of the reasons relied upon for the allowance of the writ, it should be stated at the outset that the Courts of Appeals for the Ninth and Tenth Circuits have both held that the claims here at issue are invalid for want of invention. This would seem on its face to represent a state of agreement between these appellate courts that would render all other questions moot. To say that these courts have arrived at their opinions in different ways might seem of little moment, and petitioner might be accused at the outset of begging the question. But a succession of eleven opinions in which the general pattern has been that each new court hesitates to follow the reasoning of the previous court and prefers to arrive at its opinion

in a new and different way, creates a travesty on justice and should raise serious doubts as to the wisdom in any of the opinions.

In all these eleven decisions there has been only one that did not differ with the previous opinion or at least attempt to rationalize the previous one. This was the decision of the lower court in the present action. The opinion sought to be reviewed states that the lower court "relied heavily" [R. 1192] upon previous opinions. It had little to say about the record before it, and that little was mostly wrong.[1] The appellate court has therefore largely made its own findings.

A short summary of each of these opinions is given in the appendix. It will be helpful here, however, to outline briefly the peculiar situation that developed between the appellate courts.

The first opinion that came up for review was that of Judge Harrison in *Leishman v. Associated Wholesale Electric Company,* 36 Fed. Supp. 804, in which the claims were held invalid for want of invention. The Court of Appeals for the Ninth Circuit unanimously held that the appeal was filed too late and dismissed the appeal. (128 F. 2d 204.) This Honorable Supreme Court granted certiorari and unanimously held that the appeal was filed on time. (318 U. S. 203.) The Court of Appeals then

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[1]As a matter of fact, the trial court's only reference to the evidence before it is confined to the very small portion of its decision extending from the bottom of page 46 to the middle of page 48 of the printed record, and the appellate court's opinion is primarily a lengthy reconsideration and an attempted rationalization of the few things in the instant record that were mentioned by the trial court.

acted upon the appeal (137 F. 2d 722, 727, 728), but instead of deciding the only issue that was properly before the court—that of invention—it merely struck out the holding of invalidity without formally ruling upon it and passed instead upon the issue of infringement. Rule 52(a), F. R. C. P., was then in force, and it would therefore be reasonable to conclude that the appellate court doubted the soundness of the lower court's holding of invalidity; otherwise the appellate court would not have disturbed this finding and ruled instead upon an issue regarding which the lower court had made no findings at all. The opinion of the lower court did, however, state that the accused structures contained the patented combination, but the ruling of the appellate court was to the effect that infringement of the claims had been avoided by using a plunger instead of a lever to operate the combination—although none of the claims called for a lever and two of them included no operating member of any kind.

The next decision that came up on appeal was the unpublished decision of the United States District Court for the Western District of Oklahoma in *Leishman v. The Richards and Conover Company,* Civil Action No. 2155, which held the claims valid and infringed by devices patentwise identical to those held not to infringe by the Court of Appeals for the Ninth Circuit. The Court of Appeals for the Tenth Circuit indicated that the claims, if valid, would be infringed, but it followed neither its lower court nor the Court of Appeals for the Ninth Circuit on the issue of validity. It went back to Judge Harrison's origi-

nal opinion and uncritically copied parts of his opinion almost verbatim—including the obvious errors. These errors were pointed out to the Court of Appeals for the Tenth Circuit in a petition for a rehearing, which was granted; but instead of correcting these embarrassing errors, the appellate court then made a purported mathematical analysis of the problem solved by the patent here in suits and contended that a skilled mechanic would readily arrive at petitioner's solution by the route charted by the appellate court.

In the decision of the Court of Appeals for the Ninth Circuit in the instant case, a brief explanation is given of the analysis made by the Court of Appeals for the Tenth Circuit, but there is no word indicating agreement with this analysis. The opinion says, rather, that whether or not petitioner's solution of the problem "is explainable as indicated in the diagram" made by the Court of Appeals for the Tenth Circuit "is not of particular importance here" because petitioner's solution may be explained in some other way. [R. 1200.]

If the Court of Appeals for the Ninth Circuit in the present case had stated that it agreed with the analysis made by the Court of Appeals for the Tenth Circuit and that the claims were invalid for this reason, the over-all situation would appear in an entirely different light; and regardless of how wrong the courts might be, it is doubtful that the present petition would have been filed.

But when the Court of Appeals for the Ninth Circuit decides the case on still a different basis and arrives at a

conclusion that is inconsistent with facts stated right in the opinion and attaches controlling significance to expert testimony given on direct examination that was completely refuted on cross-examination, a petition for a writ of certiorari is clearly in order.

Intermingled with the aforementioned litigation, there was another suit that added still more confusion to the situation. The two manufacturers of the products that were declared to be infringements in the aforementioned Oklahoma action, asked the United States District Court for the Southern District of California for a summary judgment of noninfringement based upon the decision of the Court of Appeals for the Ninth Circuit in the aforementioned *Associated Wholesale* case. Although this district court had stated through a different judge in the *Associated* case that a patentwise identical structure *contained* petitioner's combination, it now granted the requested summary judgment of noninfringement, and this was affirmed by the Court of Appeals for the Ninth Circuit which stated that the lower court was bound by the appellate court's earlier opinion. (167 F. 2d 890, at 892.)

This summary judgment of noninfringement was won by Radio Condenser Company and General Instrument Corporation on the theory that petitioner's combination applied only to *lever*-operated devices and that their product was operated by a plunger which was not a mechanical equivalent of a lever. Yet an attorney for one of these firms had urged before the Patent Office that levers and plungers had long been known as mechanical equivalents

for operating devices of this kind. These concerns, subsequently convicted of violating the Sherman Act because of illegal patent activities involving these devices (87 Fed. Supp. 157) have had a finger in all the litigation respecting this patent. They constructed special models that were used in the Oklahoma case [P. 175 of *Richards and Conover* record]; a documentary exhibit used against the patent in the early *Associated* case was supplied by an attorney for these concerns [Deft. Ex. C in that case]; and this same exhibit was the first exhibit introduced by respondent in the trial of the present action. [R. 695.]

There have been violations of the applicable Supreme Court decision and peculiar departures from the accepted and usual course of judicial proceedings in all but two of the aforementioned opinions.

It is advisable but impossible to point out the flaws in the various erroneous decisions in the limited space of a brief of this nature. This is a constantly increasing difficulty that plagues your petitioner. If he confines himself to the facts and the law with respect to the case at hand, and deals but little with the past, he never knows what erroneous but unrefuted statement in a previous decision may be unearthed against him. It is believed, however, that this Honorable Court will prefer that the present brief be largely restricted to the errors in the opinion sought to be reviewed, and that plan will be used in the following discussion of the Reasons Relied Upon for the Allowance of the Writ.

B. The Facts and the Law Supporting the First Reason Relied Upon for the Allowance of the Writ.

In support of the first reason relied upon for the granting of the writ, petitioner explained generally how the court had failed to follow the doctrine expressed by this court in *The Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corporation, supra,* and mention was also made of this court's opinion in *Expanded Metal Company v. Bradford, supra.* In the latter opinion this Honorable Court said (214 U. S. 366, at 381):

> "* * * It may be safely said that if those skilled in the mechanical arts are working in a given field and have failed after repeated efforts to discover a certain new and useful improvement, that he who first makes the discovery has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art, and is entitled to protection as an inventor."

In the instant case many skilled workers in the art were endeavoring to discover a certain new and useful improvement—namely, an automatic radio tuner that would be easy to adjust or "set" without having all the extra parts used in the Zenith-Schaefer tuner described in the Schaefer patent, a copy of which will be found in the record beginning at page 789. But of those who worked on this problem the appellate court mentions only Marschalk. The Summary Statement of Matter Involved explains that the engineers of plaintiff General Motors Corporation also tried to simplify this tuner; but there were still others. A brief reference to what the record shows regarding their failure will demonstrate wherein the appel-

late court has ignored this Honorable Court's decision in the *Expanded Metal* case, and references to the appellate court's statements regarding the Zenith-Schaefer tuner will show wherein the whole of petitioner's far simpler combination "exceeds the sum of its parts," as required of a patentable combination in this court's *Supermarket* decision which the appellate court has disregarded.

The appellate court explained the "setting" difficulty that Marschalk encountered when he "undertook to simplify the Schaefer device * * *" [R. 1197], and the court referred to this difficulty as "creeping." [R. 1188.] The appellate court's excellent description of "creeping" and of the "setting" process will help this Honorable Court to understand the nature of petitioner's creep-free simplification of the Zenith-Schaefer tuner, and when this is understood it will be possible more fully to demonstrate the conflict between the appellate court's opinion and the applicable decisions of this Honorable Court.

In tuners of the type involved in this suit, each button or key is provided with a part known as a *tappet;* and the station that will be tuned in by the operation of a particular button is determined by the *setting* or adjustment of its tappet.

The court explains the "setting" of Marschalk's tappet (see Marschalk's Fig. 14 on p. 17 hereof) and the *creeping* difficulty as follows [R. 1189 *et seq.*]:

> "The creeping difficulty mentioned occurred when the thumbscrew for adjusting the tappet was loosened and the tappet was moved down against the rocker whose position had been fixed by the hand setting of the tuner, the rocker being attached to the revolving shaft used for that purpose. As the tappet was

brought down upon the rocker thus positioned, the object was to permit the flat side of the loosened tappet to come against the rocker and assume the precise angle of the rocker. The thumbscrew would then be used to tighten the tappet into that position so that thereafter when the lever was pressed downward, the then rigid tappet would come against the rocker in whatever position it had then assumed, and by pressure, bring it back to the precise position in which it was when the setting occurred.

"In actual operation it was found that the Marschalk device was very difficult to set accurately for the reason that when the loosened tappet was brought down upon the positioned rocker and some pressure applied to bring the two snugly together, the rocker had a tendency to 'creep' or permit 'play.' This was particularly true when the rocker was in a position diagonal to the horizontal, and the creeping tendency was very much less, or almost non-existent, if the adjusting operation was undertaken when the rocker was in such near-horizontal position. The creeping would destroy the possibility of efficient setting or adjusting for the reason that the radio receiver must be set precisely on the right point on the dial in order to obtain good results."

The court makes it clear that this creeping difficulty had been eliminated in the Schaefer tuner which Marschalk undertook to simplify. On page 1197 the court says that "in the Schaefer device, creeping is avoided because of the attained equilibrium." To attain this equilibrium, however, Schaefer used a considerable number of extra parts.

The desirability of simplifying the abandoned Zenith-Schaefer tuner [R. 789] is at once apparent from the ap-

pellate court's own discussion of the extra parts that it included. The court's opinion contains an illustration of a portion of the Zenith-Schaefer tuner [R. 1193] from the Schaefer patent [found on page 789 of the record], and in referring to the parts by number the court says that "the rotatable member or shaft which sets the receiver is 9." This shaft 9 is the thing in the Zenith-Schaefer tuner [R. 789] which, like the rocker in Marschalk's attempted simplification, must be brought "back to the precise position in which it was when the setting occurred," as the court explained, if the station is to be tuned in properly. Instead of having the adjustable tappet directly engage the rotatable member as Marschalk had done, Schaefer interposed a group of extra parts between his tappet and the rotatable member.[2] The

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[2]Tappets had been used ever since 1883 to position rotatable shafts, and it had *always* been the practice to have the tappet directly engage the rotatable member. But these tappets were never adjustable. In clock-setting devices they were always used to set the minute hand directly on the hour, and in cash registers there were ten keys each with a *fixed* tappet to turn a number wheel so that any one of the figures from 1 to 9 or a zero would appear according to which key was depressed. The 1883 Kettell patent [R. 817] and the 1897 Woodbridge patent [R. 713], cited by respondent in the complaint [R. 7], are representative of the old structures using fixed tappets that directly engaged the rotatable member that had to be positioned. In *Leishman v. Associated Wholesale Electric Co.*, 36 Fed. Supp. 804, 808, Judge Harrison said:

> "* * * Cash registers use a rocker and tappet as demonstrated by the Woodbridge and Miller patents * * *" and he explained that "the problem before any person desiring to adapt a rocker and tappet to a radio tuning device was to develop a means for an accurate and simple method of adjusting the tappet. * * *"

But any experimenter attempting to use an adjustable tappet would encounter the peculiar creeping difficulty that Marschalk found. To produce equilibrium in such devices in order to eliminate the creeping difficulty, Schaefer as well as other inventors interposed extra parts between the adjustable tappet and the rotatable member. [R. 142-146.]

opinion says [R. 1196]: "We think it is not material here but in our view, since the racks and cross bars on each side make two rectangular frames, each shaped somewhat like a honey-comb frame, or a box without top or bottom, it would be more accurate to say that the extra parts were the two frames and the two gears, making a total of four." Each frame, however, as the court's explanation shows, is made up of two racks and two cross bars, or a total of four actual parts that had to be stamped out and attached together. The two frames are thus formed of eight parts, and these, with the two gears mentioned by the court, make a total of ten. These ten, with "the two sets of four guides" earlier recognized by the court, make a grand total of 18 extra parts.

When Marschalk tried to simplify the complicated Schaefer device [R. 789] by omitting these extra parts he encountered the creeping trouble that Schaefer had successfully avoided—and Marschalk's tuner, as the opinion tells us, "proved unsatisfactory because of difficulty of avoiding 'creeping' * * *." [R. 1188.]

Had the Zenith engineers known how to get along without so many parts in the Zenith-Schaefer tuner [R. 789], it is obvious that they would have simplified the device instead of abandoning it, and the court itself tells us that Marschalk's attempted simplification was a failure.[8]

It was mentioned in the Summary Statement of Matter Involved that the engineers of respondent General Motors

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[8]Strange as it may seem, the Schaefer and Marschalk tuners, which the appellate court has used to illustrate the problem of simplification that faced the industry, were cited by the trial court as *anticipations* of petitioner's *solution*. This is typical of the contradictions, absurdities and lack of judicial care that have characterized the thirteen years of litigation in which this patent has been involved.

Corporation also tried to simplify the Zenith-Schaefer tuner.[4] Engineers of the Crosley Corporation likewise tried to produce a simpler tuner than Schaefer had done.[5]

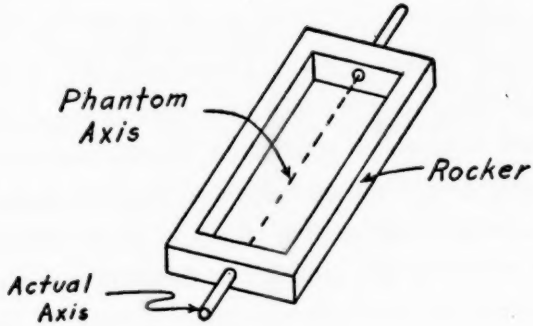
When petitioner undertook to simplify the Zenith-Schaefer tuner, he concluded that all difficulties could be avoided *without interposing any extra parts whatever* between the tappet and the rotatable member that controls the tuning *if the rotational axes of these two members, during the time of engagement, could be made to fall on a common line.* [See drawing on page 13 hereof and Fig. 2 of the patent here in suit, R. 775.] The tappet could then be permitted to come into direct contact with the rotatable positionable member just as had been done in cash registers and clock setting devices in which the tappets were never adjustable. It was when attempts were made to provide adjustable tappets that experimenters encountered the creeping problem[6] due to the peculiar lack of

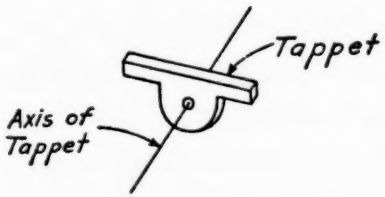
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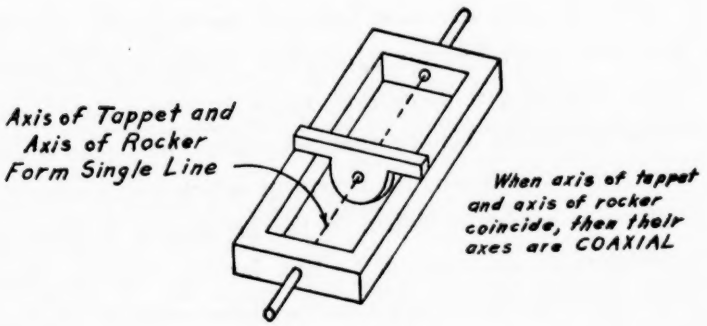
[4]A brief account of General Motors' efforts along this line appears later in this brief.

[5]The Crosley Corporation's chief research engineer, Mr. Kilgour, testified that Mr. Crosley was familiar with *the old Zenith tuner* but wanted something better [R. 486] and that one of the Crosley engineers "worked all summer and in the fall [of 1937] we decided to go into production on his device, *but it seemed to be a rather difficult one to work out practically* * * *." [R. 504, emphasis added.] In their dilemma their patent attorneys wrote petitioner [R. 1063] advising him on October 25, 1937, that Mr. Fred Johnston of The Crosley Radio Corporation had requested a report on petitioner's patent No. 2,084,851, the file wrapper of which contained the original drawings and description of petitioner's simple structure here in suit which the Crosley Corporation immediately adopted. [R. 217-219.]

[6]See footnote 2 of this brief.


Phantom
Axis
Rocker
Actual
Axis


Tappet
Axis of
Tappet


Axis of Tappet and
Axis of Rocker
Form Single Line
When axis of tappet
and axis of rocker
coincide, then their
axes are COAXIAL

equilibrium or balance that developed—and no one knew of a way to establish equilibrium and avoid creeping without interposing a lot of parts between the tappet and the rotatable member. The engineers of both the Zenith Corporation and General Motors Corporation did it in that way. But petitioner concluded that extra parts would not be required to establish equilibrium if the rotational axes of these two members were made coaxial in the completely engaged position. Since two objects cannot both occupy the same space at the same time, this required shaping them so that one could nest within the other in the engaged position.

Petitioner's simple coaxial tappet and rocker combination completely removed the difficulty that had stumped Marschalk and required all the extra parts in the Zenith-Schaefer device as well as in the simplification designed by General Motors to which reference will presently be made.

Had the appellate court followed the applicable test of invention given by this Honorable Court in *Expanded Metal Company v. Bradford, supra,* it would have concluded from this history that petitioner "has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art and is entitled to protection as an inventor." But instead, the appellate court ignored the meaning in the demonstrated inability of all these engineers to arrive at petitioner's solution and said [R. 1201-2]:

> "This court * * * has come to the conclusion that a mechanic skilled in the art, on examining the Marschalk device, would immediately observe that the solution of the problem would have to be obtained by procuring the required equilibrium and would note that the way to accomplish that would be through making the tappet and rocker coaxial."

It is clear, however, that Marschalk made no such observation, yet his patent [R. 822] shows that he was far more than a skilled mechanic. Marschalk brought his tappet directly into engagement with the positionable member as had always been done with devices using non-adjustable tappets, and he got into trouble by trying to make his tappet adjustable.[7] Schaefer and the General Motors engineers solved the problem in a complicated way by interposing extra parts. Marschalk's device has significance only because it exhibits the problem in the raw: he had no solution of any kind to offer.

The practical history of the art thus proves that the appellate court is wrong in its conclusion that any mechanic skilled in the art would arrive at petitioner's solution of the difficulty exhibited in Marschalk's device. Practical and perfect proof of the appellate court's error is contained in the Crosley Corporation patent on the Lane and Mackey tuner [R. 842]. A copy of this patent is attached to the inside back cover of this printed brief.

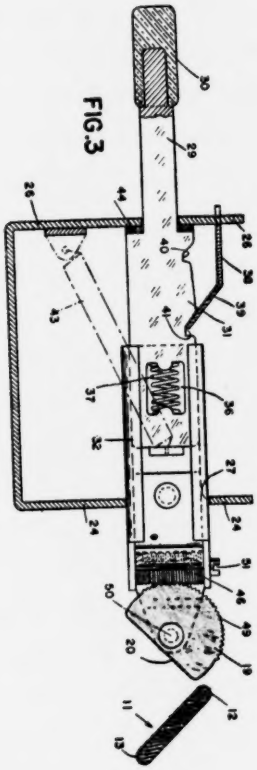
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[7]See footnote 2 on page 10 of this brief.

A reproduction of Fig. 3 from the Crosley patent appears on the opposite page above Fig. 14 from Marschalk's patent. [R. 824.] Lane and Mackey's Fig. 3 has been turned on its side for easier comparison with Marschalk's device. The tappets in each case have been colored red and the rockers green. Contrary to the appellate court's "conclusion that a mechanic skilled in the art, on examining the Marschalk device, would readily observe" that the difficulty could be cured "through making the tappet and rocker coaxial" [R. 1201-2], these engineers have provided a very complicated way of circumventing the difficulty. Instead of arriving at petitioner's simple method of eliminating the creeping that normally occurs when a freely pivoted tappet is pressed into engagement with a tilted rocker for adjustment purposes, Lane and Mackey devised a plan for adjusting the tappet without ever having to loosen it.

These two engineers, it will be observed, have taken Marschalk's tappet and placed a series of teeth 49 around its periphery and arranged a micrometer worm wheel 46 in engagement with these teeth. To adjust the tappet to the precise angle occupied by the rocker when the desired station is tuned in, the tappet is first pressed against the rocker which then initially assumes the angle to which the tappet was *previously* adjusted. While the tappet is held in firm engagement with the rocker, a screwdriver is inserted in the groove 51 in the end of the shaft of the worm wheel. This shaft and the attached worm wheel may be turned by the screwdriver, and for each complete revolution of the worm wheel the tappet is turned an amount represented by the distance between adjacent teeth on the tappet's periphery. If the tappet is kept against the rocker during this process, the rotation of the screw-

FIG. 3



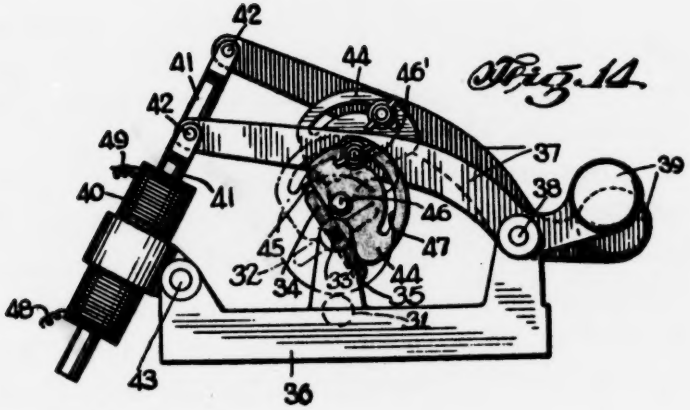


Fig. 14

driver may be used to tune in the desired station, because the rocker is attached to the tuning shaft of the radio receiver. The tappet will then of course be in the same angular position as the rocker, and the worm wheel will hold it there. The adjustment of the tappet is consequently completed when the desired station is thus tuned in.

But the adjusting process is so slow and tedious in this device that Lane and Mackey provide a latch 39 which may be used to lock the tappet against the rocker so that it will not be necessary to hold it there manually while the tappet and rocker are being rotated by the screwdriver. The bottom end of the plunger that carries the tappet moves up and down during this adjusting process, and to keep the outer end of the plunger in the same position regardless of the movement of the inner end, the plunger is made in two pieces with a spring 36 in the middle to take up the slack.

While Lane and Mackey's total arrangement avoids the creeping difficulty manifest in Marschalk's device, it is vastly more complicated than petitioner's simple answer. Certainly no mechanic skilled in the art would add such complexities to Marschalk's structure if such mecanic "on examining the Marschalk device, would immediately observe that the solution to the problem * * * would be through making the tappet and rocker coaxial," as the court tells us. [R. 1201-1202.] Here were *two* skilled workers tackling the problem together, and petitioner's arrangement did not occur to either one of them. And it did not occur to Marschalk himself. The actual experi-

ence of these three skilled artisans is practical proof that the appellate court was wrong in saying that "a mechanic skilled in the art, upon examining Marschalk's device, would immediately observe" that the problem could be solved in the way petitioner solved it.[8]

Judicial findings, where the evidence is available, should be based upon demonstrated facts and not upon demonstrable fiction.

A brief account of General Motors' attempts at simplifying the Zenith-Schaefer tuner have been left till the last, because their efforts not only add to the proof of invention on petitioner's part under the test given by this Honorable Court in the *Expanded Metal* case, ***supra,*** but the complexities in their final result as compared to that of petitioner can leave no doubt that petitioner's combination qualifies as an invention according to the standards given in this Honorable Court's opinion in the *Supermarket* case, ***supra.***

The simplification developed by the General Motors engineers was on the market for a while, and one of the units was introduced at the trial as Plaintiff's Exhibit 3. Regarding the project that culminated in this tuner, Gen-

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[8]No expert witness opposing the patent has ever been asked on direct examination to explain how to analyze the peculiar imbalance demonstrated in Marschalk's device. Knowing that such an attempt would reveal the obscurity of the reasons for creeping, petitioner's counsel John Flam on cross-examination asked Dr. Spotts, who was opposing the patent in the *Richards and Conover* suit, to make such an analysis for the court, and the explanation that he gave was easily shown to be erroneous. (See pages 13 to 17 of Petition for Rehearing of Order on Petition for Writ of Certiorari, No. 612, October Term, 1948.)

eral Motors' chief radio engineer Schwarz explained [R. 410]:

> "We started work on this in the latter part of 1936 or the first part of 1937, on the idea of mechanical push button tuners and electrical push buttons for automobile radios."

Between 1936 and the time the Exhibit 3 tuner went into production in 1938 [R. 410], design work on automatic tuners was carried on at the Delco Radio Division of General Motors by James G. Funk [Pltf. Ex. YY, R. 31], Howard M. Stelzl [Answers to Interrogatories 10 and 12, R. 31-32], William C. De Roo [Answers to Interrogatories 16 to 18, R. 32-33], and Raymond A. Shuttleworth [Answers to Interrogatories 19 and 20, R. 33], but the final product that went into production was largely devised by Mr. Schwarz [R. 336], who was chief engineer. [R. 329.]

Schwarz explained that General Motors thought it had made an improvement over Schaefer by reducing the number of parts through which the motion is transmitted from the tappet to the rotatable member, or pinion shaft. He testified [R. 337-338]:

> "* * * We felt at liberty with our design, *with what we considered some improvements,* because of the existence of the Schaefer tuner, *which we studied at the time* and knowing it was available to us. You have [in the Schaefer tuner] just the two racks on this side and two racks on that side, cooperating by connecting bars [of which there were

four], whereas on *our* tuner we have *separate racks* for *each* station, that is a rack here and a rack there (indicating), and then when you push each one you move *the single pair of racks.* And you have a single pinion going through just as have a single pinion going through on that one [Schaefer's], or a pinion shaft." (Emphasis added.)

The "pinion shaft" mentioned by Schwarz corresponds to the two gears in the Schaefer tuner, which with the four racks and four cooperating bars made a total of 10 movable parts interposed in the Schaefer device between the tappet and the rotatable member, but Schwarz explains that he uses a separate pair of racks for each station, or button. That still makes 10 extra parts for a five-button tuner. But he forgot that each rack had a lug spot-welded to it that of course had to be separately stamped out. The tappets in the General Motors tuner engage the lugs that move the racks that position the pinion. When the lugs are counted, as they must be since they are separately manufactured and separately attached parts, there are thus *twenty* extra parts in the General Motors tuner as compared to *none* in petitioner's combination where the tappet directly engages the rotatable member without any creeping and without any intervening parts at all.

Though some of the nation's best engineering brains thus failed to effect the desired improvement, your petitioner got along without the entire equilibrium-producing structures of the Zenith and General Motors tuners, with

their numerous extra parts, simply by *making over* the two basic members and changing the relative position of their axes.[9]

Petitioner's combination thus clearly meets the test set forth in this Honorable Court's opinion in the *Supermarket* case, as follows: "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable." The sum of the parts in petitioner's combination is only three even if we include the spring that holds the parts normally apart. But the whole exceeds this sum and produces a result that previously required many extra parts (18 more in the Zenith-Schaefer tuner and 20 more in the General Motors tuner that petitioner's structure displaced). "Two and two have been added together," to borrow this Honorable Court's figure of speech in the *Supermarket* case, and this time they make about twenty.

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[9]As soon as a knowledge of petitioner's combination became publicly available, the radio industry began its avid adoption. The Crosley Corporation was the first to abandon other structures and adopt the coaxial tappet and rocker arrangement. [R. 217-219.] General Instrument Corporation and Radio Condenser Company soon followed suit. [R. 221, 229-230.] After having discarded its own Schaefer tuner a decade earlier, the Zenith Corporation also adopted petitioner's vastly simpler construction, purchasing the complete units from petitioner's own licensee. [R. 225-226.] Zenith later tried a tuner of a totally different type, but in May, 1948, it returned to petitioner's structure [Deft. Ex. GGG] with the public announcement [R. 1140] that "This system is so simple and fool proof, that complete replacement should seldom, if ever, be necessary." Respondent General Motors Corporation abandoned its own simplified but still complicated version of the Schaefer tuner, adopted petitioner's coaxial tappet and rocker construction, used it in a million tuners, and filed this Declaratory Judgment suit asking the court to hold that petitioner's combination involved only mechanical skill—although it was obviously beyond the skill of its own engineers.

It would be difficult to find a more classic example of a device that thoroughly meets the test set forth in the *Supermarket* opinion, but the appellate court ignores both the opinion and the test.

In *Landis Machine Company et al. v. Parker-Kalom Corporation et al.*, 190 F. 2d 543, 546, Judge Learned Hand, in his last patent opinion stated:

> "* * * The issue is always how far beyond commonplace contriving was the foresight necessary to think out the combination. Usually, though not always, it is practically impossible to decide that issue by a mere inspection of the patented disclosure against the background of the prior art. Moreover, it scarcely needs more than the statement of the question to disclose the fatuity of asking judges, undisciplined in the craft and untutored in its inarticulate presuppositions, to say how far the innovation is beyond the powers of merely competent craftsmen. For that reason we have over and over again resorted to the history of what went before, the duration of the period during which the invention was needed but failed to appear and its acceptance when it did. These circumstances have seemed to us, not indeed an absolute determinant of invention, for there is none; but at least the best, and indeed almost always the only, rational approach to a solution."

And the Court of Appeals for the Second Circuit sent the case back to the lower court to see if such evidence could be obtained. In the instant case, this type of evidence was already before the court.

In *Graver Tank & Manufacturing Co., Inc. v. Linde Air Products Co.*, 70 S. Ct. 854, 856, this Honorable Supreme Court said: "Equivalence * * * is not an abso-

lute to be considered in a vacuum." This could be said with even greater force of *invention.* If it is fatuous, as Judge Learned Hand thinks, to ask a court to decide the issue of invention without such practical facts as were before the Court of Appeals for the Ninth Circuit in the instant case, how much more fatuous is it for the court to ignore such facts and retire into a vacuum to decide the issue? Just how fatuous it is will appear from the discussion of the next reason relied upon for the allowance of the writ.

C. Data Supporting Petitioner's Second Reason Why the Writ Should Be Granted.

The second reason why the writ should be granted was expressed broadly in one sentence as follows:

> *"The appellate court in deciding the issue of invention has not exercised the care which this Honorable Supreme Court has admonished the lower courts to use, and has so far departed from the accepted and usual course of judicial proceedings as to call for an exercise of this Honorable Court's power of supervision."*

The petition mentioned three incidents demonstrating the appellate court's serious departures from the accepted and usual course of judicial proceedings.

a. Testimony Relied Upon by the Appellate Court but Property Ignored by the Trial Court Was Controverted on Cross-Examination.

The appellate court apparently realized that its own account of Schaefer's complexities and Marschalk's difficulties were contradictory to its assertion that only mechanical skill was involved in petitioner's solution of how to eliminate creeping without using a lot of parts besides

the tappet and the rotatable member that is to be positioned. At any rate, the court supports its unrealistic holding by contending that it is prohibited from overruling the trial court because of certain testimony of respondent's expert which the trial court had the exclusive opportunity of hearing. The testimony referred to by the appellate court was given on direct examination by respondent's chief radio engineer Schwarz, and it is typical of the serious carelessness of the appellate court that it did not bother to determine whether this testimony held up on cross-examination or had influenced the trial court in any way. The appellate court's opinion says [R. 1202-3]:

> "* * * the trial court had the exclusive opportunity of listening to the oral testimony which dealt with this principle [which petitioner used to avoid creeping]. Thus it was testified by one of appellee's engineers that the engineering principle which lies behind the coaxiality here involved, was the principle of symmetry or concentricity, long known to machine designers as a means of avoiding moment arms. The testimony thus given appears to us to be reasonably credible and to mean that the principle which was applied by appellant is one designed to eliminate the moment arm through the establishment of symmetry, equilibrium or balance. We think therefore that this particular finding must be held to be the result of a determination of a question of fact, which cannot be said to be clearly erroneous, and that Rule 52(a) Federal Rules of Civil Procedure prohibits us from disturbing it."

A mere reading of the lower court's opinion reveals that no mention whatever is made of the said testimony, which was given by respondent's chief radio engineer Schwarz,

nor is any reference whatever made to the said engineer himself either in the decision or in the findings of fact. And for a very good reason. The testimony which the appellate court says "appears to us to be reasonably credible" were all made in Schwarz' carefully prepared, self-serving, direct testimony, and it did not seem credible at all to the trial court *because it was exploded on cross-examination.* Thus:

"Q. (By petitioner's attorney John Flam): Will you answer whether you have ever made parts coaxial in order to prevent movement of one of the parts? A. (By respondent's engineer Schwarz): *I cannot think at this moment of an instance.*

Q. Can you think of any example of one in which movement of both parts is prevented after they have become coaxial?

* * * * * * * *

The Witness: May I hear the question again?

(The question referred to was read by the reporter as follows: 'Can you think of any example of one in which movement of both parts is prevented after they have become coaxial?')

The Court: Movement of both parts?

Mr. Flam: Yes.

A. *I am sorry, I can't at this moment.*

Q. (By Mr. Flam): Then, so far as you know, this arrangement shown in the Leishman patent and as exemplified in these exhibits is unique, you haven't been able to find anything prior to 1937 like it, is that right? A. I haven't testified to the fact that I have seen this device presented to me as coaxiality. I don't believe that I could say that as of 1937 or 1938 or 1939 was the beginning of seeing this device as a unique one.

Q. Prior to 1937 you saw no device, then, in which the principle or relationship of the parts utilized coaxiality to prevent any movement of one or both of the parts that become coaxial. A. *I cannot think of an instance at this moment.*" [R. 429-430; emphasis added.]

Instead of coaxiality being "long known to machine designers as a means of avoiding moment arms" (that cause turning), as this witness had testified on direct examination, he thus could not think of a *single* instance, when pinned down on *cross*-examination, in which a coaxial relationship had ever been used for such a purpose.

The fact that a coaxial relationship between parts had never before been used to stop unwanted rotation was thus established by respondent's own expert witness and chief radio engineer[10]—a man who, moreover, had himself super-

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[10]The unprecedented nature of petitioner's use of a coaxial relationship was also confirmed by the expert witness opposing the patent in the *Richards and Conover* case. This witness was Dr. Spotts, Associate Professor of Machine Design at Northwestern University. On cross-examination he testified:

"Q. [By Mr. Flam]: Do you know of any device where a freely pivoted member presses on another freely pivoted member, both members being on separate pivots, in which movement between them is prevented by making them coaxial in a fully engaged position?"

(Dr. Spotts at first did not grasp all of this question. Mr. Flam's clarification and Dr. Spott's answer were as follows:

"Q. Here we have two relatively movable bodies on separate axes and when they are brought together in full engagement there is some relative movement which is prevented by bringing the axis of one into the axis of the other. Do you know of *any* such device? *If you do I would like to hear about it?* A. *I don't believe I know of any.*" [Pp. 195-196 of the *Richards and Conover* record, filed by respondent herein, emphasis added.]

The district court in the *Richards and Conover* case made the following finding on this point:

"14. The defendant presented no example of the use of a coaxial relationship that was at all analogous to the use made

vised a group of engineers in a research program that resulted in a tuner with many extra parts when they attempted to simplify the Schaefer device. Had Schwarz or the other General Motors engineers known of any prior use of a coaxial relationship for the prevention of rotation, they would themselves have arrived at petitioner's structure instead of the more complicated device which they later abandoned in favor of petitioner's combination.

Schwarz' admissions on cross-examination as to the unprecedented nature of petitioner's use of a coaxial relationship should alone have been determinative of the issue of invention.[11] But it is utterly useless to cross-examine witnesses if the appellate court, as here, looks no further than the carefully prepared, self-serving, direct testimony of the witness and then says that because of

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of this relationship in the combination set forth in the claims of the reissue patent in suit; and defendant's expert, Dr. Spotts, stated on cross-examination that he knew of no instance in which a coaxial relationship had been previously used for a similar purpose." [*Richards and Conover* record, p. 30.]

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[11]A complete case as to the presence of invention in petitioner's combination was actually made out from General Motors sources alone: Schwarz testified that respondent's own complicated tuner [Pltf. Ex. 3] resulted from an attempt to simplify the Schaefer tuner; the answers to interrogatories revealed that five men were working on the General Motors tuner project; Schwarz admitted that the G. M. simplification of the Schaefer tuner had been abandoned in favor of petitioner's simpler construction; Schwarz testified that petitioner's construction had been used in more cars than all previous types of tuners combined; and Schwarz admitted that he knew of no analogous use of a coaxial relationship anywhere.

In a similar situation, this Honorable Court said:

"The plaintiff's case as presented on the record is largely the presumption of validity and novelty attaching to the patent and such evidence as comes from defendant's witnesses. A case that can be made out in all its elements by cross-examination of opposing witnesses is a strong case." *Eibel Process Company v. Minnesota and Ontario Paper Co.*, 261 U. S. 45, at 53.

such testimony and Rule 52(a) it cannot overrule the trial court.

Instead of the Schwarz' testimony creating a situation in which the trial court could not be overruled because of the provisions of Rule 52(a), it created an opportunity to show through cross-examination that petitioner's combination meets *all* the tests of invention applied by this Honorable Court in *Jungersen v. Ostby and Barton Company,* 335 U. S. 560.

In this connection, other portions of this brief have shown a situation similar to that recognized by Mr. Justice Jackson in his dissenting opinion in that case where he said (p. 571):

> "* * * but Jungersen's success was grounded not in the gullibility of the public but in the hard-headed judgment of a highly competitive and critical if not hostile industry. Knowing well its need for and its failure to achieve improvements on available processes, that industry discarded them, adopted this outsider's invention and made it a commercial success."

Of Mr. Schwarz' direct examination, no comment is more appropriate than the following quotation from the previous opinion of Judge Learned Hand which Mr. Justice Frankfurter and Mr. Justice Burton adopted as their own (p. 570):

> "* * * If all the information was at hand, why was the new combination so long delayed? What better test of invention can one ask than the detection of that which others had all along had a strong incentive to discover, but had failed to see, though all the while it lay beneath their eyes?"

But the majority held that Jungerson's claimed improvement was not patentable because (p. 566):

> "* * * Where centrifugal force was common as a means of introducing molten metal into the secondary mold, its use in an intermediate step to force molten wax into the primary mold was not an exemplification of inventive genius such as is necessary to render the patent valid. * * * The patentee himself admitted that the same principle was employed in both steps. Thus Jungersen employed in his claimed invention well known skills and practices *in a manner and for a purpose long familiar in the field of casting.*" (Emphasis added.)

In the instant case, the cross-examination of Mr. Schwarz showed that he knew of no instance anywhere in which a coaxial relationship had ever been used *in the manner* in which petitioner used it *or for any similar purpose* in the field of automatic tuning *or anywhere else.* And Dr. Spotts testified to the same effect in *The Richards and Conover* case, as shown in footnote 10 of this brief.

It is thus manifest from the cross-examination of expert witnesses opposing the patent that petitioner's combination meets *all* the tests of invention applied in the *Jungerson* case.

It would go a long way toward the clarification of the law with respect to invention if this Honorable Court were to pass upon this case where so many tests of invention may be *affirmatively* applied. The tests of invention given in the *Supermarket* case, *supra*, have already been shown to be *affirmatively* applicable here.

b. An Engineering Observation Made by the Court of Appeals Is Shown to Be in Error by the Testimony of a Witness Quoted in the Opinion.

In another part of the opinion the appellate court relies upon an engineering observation of its own making, and in this instance the court was so careless that it did not notice that its statement was a direct contradiction of the testimony of an expert who opposed the patent and whose pertinent statement the court had already quoted with apparent approval.

The trial court, it will be remembered, had erroneously held that Schaefer and Marschalk anticipated petitioner's contribution. In an effort to uphold the trial court with respect to Schaefer, the appellate court says [R. 1196-1197):

> "* * * We think that it is manifest from the exhibits that the trial court could fairly conclude that the principle which prevents creeping in the Schaefer tuner is the principle of equilibrium or balance,[12] and that creeping does not occur for the simple reason that when the specially shaped tappet 56 is pressed firmly in position upon the arms or cross bars 32 and 34, the pressure upon each arm is identical. It is true that the arms move up and down upon the racks instead of rotating, but *basically the desired result is obtained because the tappet is so shaped and located that an imbalance is not possible.*" (Emphasis added.)

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[12]No judicial conclusion of any kind was required as to the necessity of "equilibrium or balance" to eliminate creeping. Every worker in the art of course knew that from the outset. The problem was how to obtain the equilibrium or balance without using a lot of parts besides the tappet and the rotatable member that has to be accurately positioned.

Three paragraphs back in its opinion, however, the court had already quoted Dr. Spotts to the effect that the location of the tappet was immaterial to the operation of Schaefer's tuner. Dr. Spotts, Associate Professor of Machine Design at Northwestern University, was the expert opposing the patent in the *Richards and Conover* case. Regarding his testimony on this point the court says [R. 1195-6]:

> "The witness also testified that the round spot, No. 55 (the pivot of the Schaefer tappet), could be moved sidewise 'without any effect in the operation' of the Schaefer tuner, and that this could be done so long as 'you have lateral support for members 26 and 27. . . . Providing that did nothing more than make points 57 and 58 retain contact with the horizontal surface.'" (Omissions and parenthetical explanation by the court.)

If the pivot of Schaefer's tappet can "be moved sidewise 'without any effect in the operation' of the Schaefer tuner" providing the tappet "points 57 and 58 retain contact with the horizontal surface," then the location of the tappet is clearly immaterial to the desired result in the Schaefer tuner, and the court is obviously mistaken in saying that "the desired result is obtained because the tappet is so shaped and located that an imbalance is not possible."[18]

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[18]The first and second paragraphs of Dr. Spotts' testimony following the portion quoted by the court show that the location of the little tappet can be changed as much as a quarter of an inch without effecting the operation of the device; thus:

> "Q. [By Judge Chandler]: It [the center of Schaefer's tappet] could be moved anywhere on that line you have drawn across there? A. I don't mean over here (indicating).

It is the "lateral support for members 26 and 27" and *not* the location or shape of the tappet that Dr. Spotts stresses as essential in the testimony quoted by the court. The lateral supports are the four guides for these members. If the lateral supports are essential, then the members which they support must also be essential. These members 26 and 27 are component parts of the two frames previously mentioned by the court (see p. 11 hereof), these frames being formed of four parts each which require eight guides in all. The toothed frames mesh with, and move, the two gears previously mentioned by the court (p. 11 hereof). We thus get back to the fact that equilibrium is obtained and creeping prevented in the Schaefer tuner by means of the 18-part gear, rack and guide system and not at all by the location of the tappet or its pivot 55.

It is inexcusable for the court to express its own unsupported engineering opinion on an important point of this kind without even noticing that such opinion is contrary to its own quotation from the expert testimony of an authority who was opposing the patent.

Q. I understand, but a reasonable distance so it would not conflict with any of the other parts. Now if it is moved a quarter of an inch to the left of your line you say it would still work? A. Providing there is lateral guidance." [P. 192 of the *Richards and Conover* record, filed by respondent as part of the present record.]

Judge Chandler not only heard this witness testify, but did the cross-examining himself. Judge Chandler concluded that invention was involved in petitioner's simple solution of the creeping problem which eliminated all the extra parts from Schaefer's mechanism. His pertinent finding with respect to Schaefer was as follows:

"19. Schaefer, exhibit 20, Marschalk, exhibit 18, Lane and Mackey, exhibit 22, and Soffietti, exhibit 21, in Italy all tried to produce acceptable tuners using an adjustable tappet, but their tuners were all either more complex or much harder to adjust than plaintiff's [Leishman's] simple structure." [*Richards and Conover* record, p. 31.]

c. A Purported Model of a Portion of a Device for Recording Variations in the Amount of Carbon Dioxide in Flue Gas, Is Accepted by the Court as an Anticipation of Petitioner's Tuner, Although Clearly From a Non-Analogous Art, and Respondent's Witness Admitted Under Cross-Examination That the Model Departed From the Original Structure in Order to Simulate Petitioner's Combination.

The appellate court exhibits even greater carelessness in uncritically accepting the Cunningham patent as some kind of an anticipation. The court itself informs us [R. 1205] that "The Cunningham patent is a device for determining the amount of carbon dioxide in fluid gas [this should be flue gas] so that its automatic determination will record or control combustion in a furnace." Such a device would seem on its face to be from a totally non-analogous art, but the appellate court says that "A part of the patented device [Cunningham's] includes an apparatus for automatic shaft setting." But the kind of "automatic shaft setting" that takes place in Cunningham's device is entirely different from, and non-analogous to, the kind of automatic shaft setting that takes place in automatic tuners. In automatic tuners, the purpose is to automatically return a shaft precisely to the position that it previously occupied when the original setting took place. In Cunningham's device [R. 741] the shaft that is set is the shaft 58 [Figs. 1 and 9] that moves the recording pen 62, Fig. 2, or the shaft that controls the combustion in the furnace, and these shafts are re-set at regular intervals *not* in accordance with positions that they previously occupied, but in accordance with the amount of carbon dioxide then present in the flue gas that is going up the chimney. As the amount of carbon dioxide varies, it causes a float 38, Fig. 1, to move up or down, and Cunningham's device

is *to transmit* the movement of the float 38 to the recording pen 62 or to the shaft that controls the combustion in the furnace in order to get the greatest possible efficiency from the fuel and to prevent unburned gases from going up the chimney. Cunningham accordingly calls his mechanism a "Power Transmitting or Registering Device" [R. 741.]

In an earlier portion of the opinion the court explained that it is necessary in adjustable tappet tuners to adjust the loosened tappet to the exact angle assumed by the rocker when the desired station is carefully tuned in by hand, and the court explained that the creeping difficulty arose during this process. In the Cunningham device, the part 55 alleged to resemble the "tappet" is *never* adjusted to the position of the "rocker" 57, and the entire process in which creeping occurs in an automatic tuner is consequently absent. Since Cunningham thus never encounters the creeping problem, it obviously cannot be held that he anticipated petitioner in providing a simple solution.[14]

The appellate court says [R. 1206] that the lower court's finding about the Cunningham device "refers to the testimony of one of appellee's witnesses respecting a model constructed in accordance with the Cunningham patent and which was introduced in evidence at the trial." If the appellate court had examined this model and the Cunningham patent with reasonable care, it would have discovered that this model departed from Cunningham's device in very material respects. Parts that were essential for the normal

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[14]In *Leishman v. The Richards and Conover Company*, the court properly dismissed the Cunningham device with the significant statement: "You mean to say the question doesn't arise." [P. 82 of the printed *Richards and Conover* record filed by respondent in the instant case.]

operation of the mechanism were entirely omitted and other parts were added in order to make it perform a function for which it was never intended.[15] Such a device is not an anticipation, for this Honorable Court has held:

> "It is not sufficient to constitute an anticipation that the device relied upon might, by modification, be made to accomplish the function performed by the patent in question, if it were not designed by its maker, nor adapted, nor actually used, for the performance of such function." (*Topliff v. Topliff,* 145 U. S. 156 at page 161.)

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[15]These alterations were so great that they were gradually conceived over a period of years by those opposing the patent. The continued alterations and their purpose were admitted by respondent's own expert, Dr. Mackeown, as follows:

> "Q. (By Mr. Flam): Dr. Mackeown, when was that model made, Plaintiff's Exhibit 11? A. Well, it was made excluding the gear mounted on the shaft, corresponding to shaft 58 of the patent, and the tuning unit. *The rest of the metal parts were made prior to the Associated case.* * * *" [R. 472; emphasis added.]

(The *Associated* case, here referred to, was the case of *Leishman v. Associated Wholesale Electric Company,* 36 Fed. Supp. 804, tried in 1940—8 years before the trial of the instant action.)

> "Q. When was the condenser and the gear added to that model? A. *Oh, something about a year ago.*" [R. 472; emphasis added.]
>
> "Q. The model, Exhibit 11, has no hammer or anything like that on it. When was that taken off of the model? A. Oh, that was taken off *a few days ago. It served no purpose in tuning a radio or positioning a tuning condenser of a radio set.*
>
> Q. But it was a very important feature of the Cunningham device, was it not, to adjust the wheel in accordance with the float? A. It was used for the purpose indicated in the Cunningham patent, 1930192, to position the wheel 55.
>
> "Q. Wasn't that a very important part of the Cunningham device, to position that wheel? A. *If you use it for measuring flue gas I think it would be, as Cunningham did, but not if you adapt this device for tuning a radio condenser.*" [R. 474; emphasis added.]

The representative errors here discussed are indicative of a carelessness that clearly calls for this Honorable Supreme Court to exercise its supervisory powers. In its opinion in the *Supermarket* case, *supra,* this Honorable Court admonished the lower courts to use great care in deciding patent cases, but this admonition was unheeded here.

In the *Supermarket* case, the carelessness of the lower courts was in holding an obviously invalid patent valid. It is at least just as serious to carelessly hold a valid patent invalid, for then the patent laws fail entirely to serve their constitutional end. After thirteen years of this sort of thing, in which three large corporations through Declaratory Judgment actions have appropriated his contribution to the advancement of the art, your petitioner feels that the patent system has become a snare and a double-cross. The inventor is induced to do his best by the constitutionally supported statutes that promise him a reward for advancing "the useful arts," but after he has spent his time and money in developing something novel and manifestly beyond mechanical skill, and which receives the tribute of almost universal adoption, he is told that the government's contract with him is no good and that the financial rewards are all to go to the big corporations that have exploited him. The patent laws are based upon the same constitutional provisions as the copyright laws; but the copyright laws are for some reason administered differently, and no author is forced to see his work published as anonymous by well known publishing houses that recognize no obligation to him.

D. Data Supporting the Third Reason Relied Upon for the Allowance of the Writ.

To make it unnecessary for the court to refer back to the Petition for the third reason relied upon for the allowance of the writ, the two paragraphs reciting this reason are here repeated.

3. There has long been a conflict between the Court of Appeals for the Ninth Circuit and three other courts including the Court of Appeals for the Tenth Circuit regarding whether a lever is a part of petitioner's patented combination, and the Court of Appeals for the Ninth Circuit has now ballooned its old untenable contention that a lever *is* a part of this combination into a primary reason for holding that petitioner's contribution does not meet the test of invention which it applied in *Pointer-Williamette Co. v. Six Wheel Corporation,* 177 F. 2d 153.

If this Honorable Court should resolve this conflict by recognizing that an operating member is not a part of the combination claimed in claims 7 and 8, and that the "manual operating member" or "manual operating means" called for in the other three claims does not have to be a lever, then the Court of Appeals for the Ninth Circuit could no longer hold that petitioner's combination does not meet the test for invention set forth in the *Six Wheel* case, *supra.* This would also automatically decide the issue of infringement.

In the eighth paragraph of its opinion [R. 1188], the appellate court correctly says: "In brief it may be said that the claimed invention relates to the problem of providing a simple and easy method of setting the *buttons*

or *keys* of an automatic tuner so as to bring in, upon pushing *any button* or *key,* the desired broadcasting station selected from a broad band of frequencies." (Emphasis added.) But near the end of its opinion, the court forgets its recognition of the broad purpose of the invention and illogically has the invention relate only to the provision of a simple and easy method of setting *lever*-operated tuners so that the desired station will be brought in upon pushing any *lever.* Thus the court asserts [R. 1209-1210] that the fourth requirement of its test of invention has not been met by petitioner's patented combination, because—

> "* * * the evidence fails to show that it superseded any prior devices or met with any commercial success. No *lever* operated tuner with appellant's tappet rocker system, either with or without the additional provision for television tuning, was ever built commercially. The only tuners manufactured under license from appellant were *leverless* push-button tuners of the type held not to be covered by the patent in suit in Leishman v. Commercial (*sic*) Electric Co., *supra.*"

Claims 7 and 8 call only for the tappet and rocker combination discussed throughout the court's opinion and in this petition and brief, and no lever or other operating member is called for. Respondent's chief radio engineer Schwarz admitted that this combination had been used in about one million Buick, Pontiac and Chevrolet cars [R. 415] before the date of the trial, as well as in an additional large number of Oldsmobiles and Cadillacs. [R. 415.] The U. S. District Court for the Western District of Oklahoma held that this combination had been

used in approximately eight million tuners during a period preceding General Motors' use. [Finding 25, p. 32, of The Richards and Conover record, filed by respondent with the present record.]

The appellate court's insistence upon dragging a lever *per se* into petitioner's combination, despite the fact that none of the claims call for a lever, is based upon its opinions in *Leishman v. Associated Wholesale Electric Company, supra,* and *Leishman v. Radio Condenser Company and General Instrument Corporation, supra,* in both of which the appellate court decided the issue of infringement without formally ruling upon the issue of invention. In both cases the accused devices were patentwise the same as those manufactured by respondent, and in both instances the court held there was no infringement because the accused tuners were operated by plungers rather than by levers. The court said the reissue claims in issue were not for the same invention as the original patent unless they included levers. Irrespective of the broadly worded objects in the original patent, the presence therein of claim 5 was alone enough to refute this thesis, for this claim contained no operating member of any kind. But the court refused to take this claim into consideration because it had later been disclaimed. It was not disclaimed, however, until some months *after* the reissue had been granted on an *identical* specification with *six claims that did not include* levers, and it was then disclaimed only because it was discovered to be so broad that it could be read upon Marschalk. [R. 290.] None of the other leverless claims were disturbed by this disclaimer. After the court thus read a lever into each of the claims, it said that plungers were not equivalents of levers.

The district courts in the Ninth Circuit were thereafter of course not at liberty to disturb this ruling, but all the courts not specifically controlled by it have emphatically expressed a different view.

In the earlier decision of the district court for the Southern District of California in *Leishman v. Associated Wholesale Electric Company,* 36 F. Supp. 804, 806, the court specifically stated with respect to the *plunger*-operated Crosley tuner:

> ". . . it cannot be seriously denied that the accused device uses a rotatable rocker, adjustable tappet and when brought to rest the two parts are coaxial—*the essential elements contained in the plaintiff's* [*Leishman's*] *structure.*" (Emphasis added.)

A few paragraphs later in the decision, Judge Harrison reiterated:

> ". . . as I have stated before, it contained plaintiff's combination, . . ."

In the case of *Leishman v. The Richards and Conover Company,* which was tried in the U. S. District Court for the Western District of Oklahoma, Civil Action No. 2155, the tuners were patentwise identical to those accused in the Ninth Circuit *Associated* case, *supra,* and those fighting the patent accordingly cited the decision of the Court of Appeals for the Ninth Circuit which held that plunger operated tuners were outside the scope of the claims. The U. S. District Court for the Western District of Oklahoma nevertheless stated that "to me this is a very clear case of the validity of a patent and in-

fringement." [P. 224, Richards and Conover record.] And his findings included the following [p. 29-30 thereof]:

> "11. The tappet or positioning element described in plaintiff's reissue patent No. 20,827 may be mounted either on a lever or a plunger to move the tappet, since a lever and a plunger perform their functions in the same way and are mechanical equivalents.
>
> "12. The finding 11 is based not only upon the evidence offered on behalf of plaintiff, but also upon the direct testimony of defendant's expert, Dr. Spotts, who testified to the effect that the substitution of plungers for levers is a simple one in the combination covered by claims 7, 8, 9, 10 and 11 of the said reissue patent.
>
> * * * * * * * *
>
> "16. The use of plungers for operating mechanical automatic tuners was known long prior to plaintiff's development of his patented structure set forth in the reissue patent in suit."

By the time *The Richards and Conover* case, *supra,* reached the Court of Appeals for the Tenth Circuit, the Court of Appeals for the Ninth Circuit had rendered its decision in *Leishman v. Radio Condenser Company, et al., supra,* in which it reaffirmed its decision in the *Associated* case and thus freed the plunger operated tuners of Radio Condenser Company and General Instrument Corporation, which said tuners were the same ones involved in *The Richards and Conover* case. The two decisions of the Court of Appeals for the Ninth Circuit were accordingly cited in behalf of The Richards and Conover Company, but the Court of Appeals for the Tenth Circuit, after

mentioning these two Ninth Circuit decisions, nevertheless said (172 F. 2d 365, 368, 369):

> ". . . claims 7 to 11, inclusive, embrace a single rocker and corresponding adjustable tappets mounted on pivots, *means for moving each tappet* so one of its sides engages one arm of the rocker and rotates the rocker until the other side of the tappet engages the other arm of the rocker, and *they do not specifically embrace a lever means for carrying and moving the tappets; and we are unwilling to rest our decision on the narrow ground that the lever in the device of the patent in suit and the plunger in the accused device are not mechanical equivalents.*[3]" (Emphasis added.)

Footnote No. 3 of the said decision then referred to a previous Tenth Circuit opinion in which it had specifically held that a member moving in a straight line like a plunger "responds to the claims in suit equally with one where" the corresponding member moved "on a hinged joint" like a lever. Footnote No. 3 also referred to paragraph in Walker on Patents, Deller's Edition, Volume 3, page 1706, Section 468, that elucidates the pertinent doctrine.

The Court of Appeals for the Ninth Circuit is thus alone in its view that a lever is a part of petitioner's combination; but this theory, which in its earlier decisions applied only to the issue of infringement, has been expanded in the instant case into a reason why the combination does not meet the test of invention which the

court applied in its *Six Wheel* decision. Were it not for the court's peculiar insistence upon reading a lever into the claims, despite the fact that none of the claims call for a lever and two of the claims omit the operating member altogether, the application of the test used in the *Six Wheel* case would have necessitated a holding that invention was involved in the claims at issue.[16]

---

[16]When the claims are literally read, this test, as set forth in the *Six Wheel* decision, 177 F. 2d 153, 162, would be applied as follows:

> "'Courts,' said Judge Learned Hand, 'made up of laymen as they must be, are likely either to underrate, or to overrate, the difficulties in making new and profitable discoveries in fields with which they cannot be familiar; and, so far as it is available, they had best appraise the originality involved by the circumstances which preceded, attended and succeeded the appearance of the invention. Among these will figure the length of time the art, though needing the invention, went without it.'" [the record shows that the search for a satisfactory tuner began in 1924, but if we consider only the filing date of the Schaefer patent mentioned by the court, it is clear that the art went without the present invention from 1928 until 1938 when petitioner's original patent issued] "'the number of those who sought to meet the need and the period over which their efforts were spread:'" [if we confine this to those trying to produce a simpler adjustable tappet tuner than Schaefer had done, the present record discloses the names of Marschalk, Soffieti, Lane and Mackey and the General Motors engineers Funk, Stelzl, DeRoo, Shuttleworth and Schwarz] "' how many, if any, came upon it at about the same time, whether before or after:'" [there is no evidence that anyone else came upon appellant's solution at about the same time, either before or after] "'and, perhaps most important of all—the extent to which it superseded what had gone before.'" [Were it not for the appellate court's impression, with which all the other courts disagree, that a lever was somehow a part of petitioner's combination, there could have been no denying that his combination largely superseded everything else that had gone before, and the test would thus have compelled a ruling that his contribution involved invention.]

Conclusion.

Any one of the five reasons relied upon for the allowance of the writ should be sufficient, and it is therefore respectfully urged that the petition be granted.

Respectfully submitted,

LeRoy J. Leishman,
In Propria Persona,

John Flam,
Counsel.

Dec. 12, 1944. G. M. LANE ET AL 2,365,088

STATION SELECTOR

Filed Nov. 29, 1937 2 Sheets-Sheet 1

FIG.5

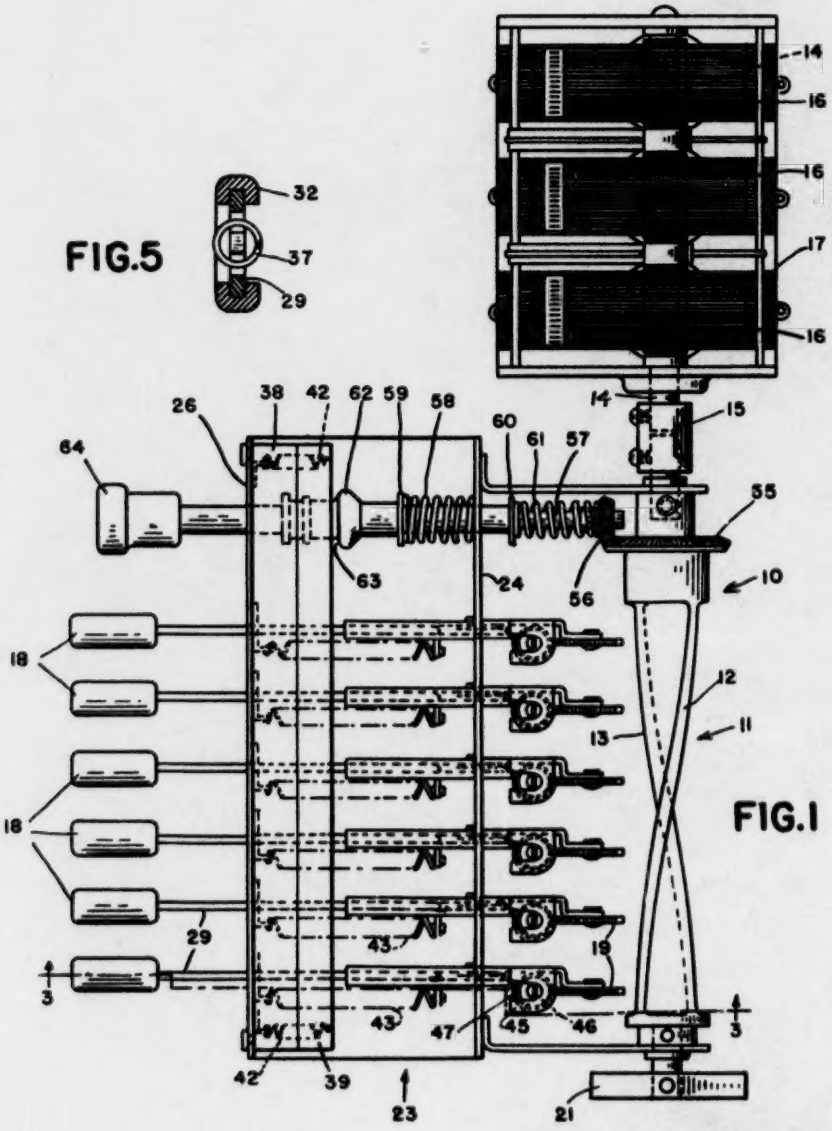


FIG.1

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STATION SELECTOR

Filed Nov. 29, 1937 2 Sheets-Sheet 2

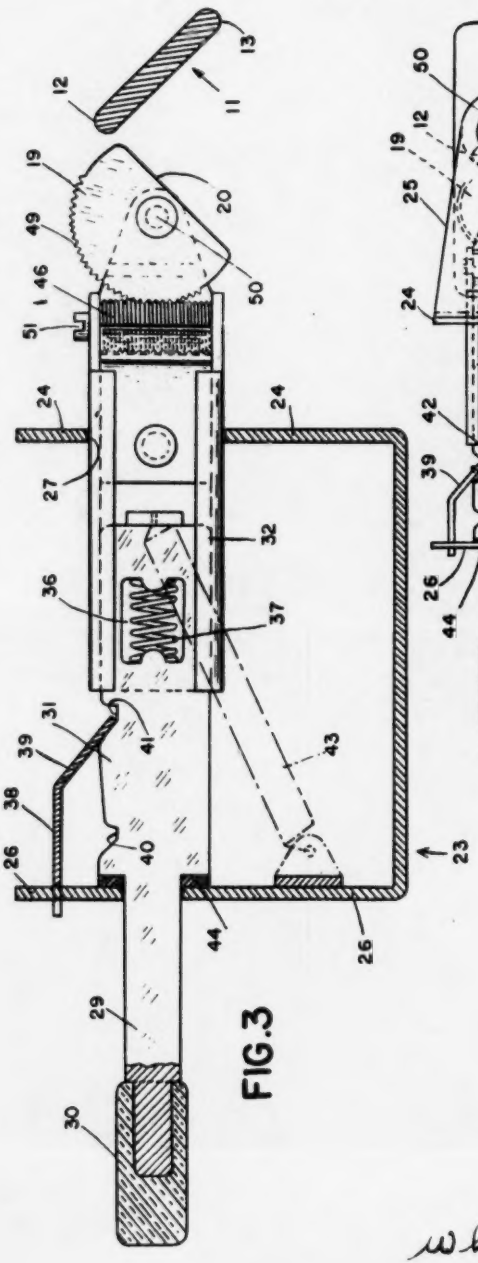


FIG.3

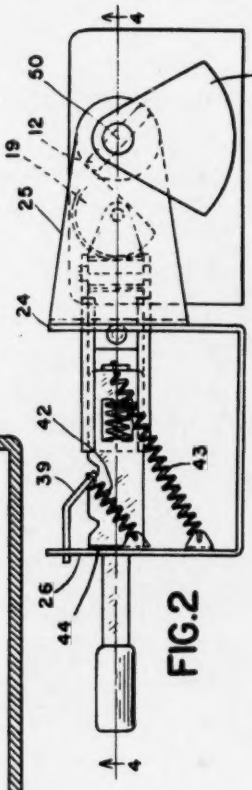


FIG.2

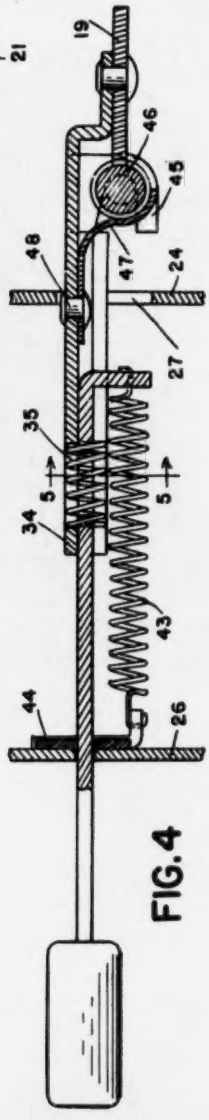


FIG.4

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2,365,088

STATION SELECTOR

Guy M. Lane and Henry W. Mackey, Detroit, Mich., assignors to The Crosley Corporation, Cincinnati, Ohio, a corporation of Ohio

Application November 29, 1937, Serial No. 177,163

12 Claims. (Cl. 74—10)

This invention relates generally to radio receiving apparatus and refers more particularly to station selectors of the type embodying a plurality of controls for independently adjusting the variable condensers in the tuning circuit of the radio receiving apparatus.

The principal object of this invention resides in the provision of mechanical means operatively connecting each of the controls to the condensers and effective upon selectively manipulating the controls to tune the radio circuit to the predetermined wave length.

Another advantageous feature of this invention resides in the provision of a station selector wherein the controls are in the form of independently operable push buttons respectively mechanically connected to the variable condensers in such a manner that movement of any one of the buttons to its extreme position of adjustment operates the condensers as a unit to tune the radio circuit to a particular wave length. In accordance with this invention, the push buttons correspond to the wave lengths assigned to different stations and the radio circuit may be tuned to selectively receive these stations by merely pressing the push buttons to their extreme operative positions.

A further object of this invention consists in the provision of a station selector having means in association therewith for actuating the condensers to tune the radio circuit independently of the push buttons.

In addition to the foregoing, the present invention contemplates a station selector which is relatively simple in construction and which is capable of accurately tuning the radio circuit to any one of a plurality of wave lengths with the minimum amount of attention and skill on the part of the operator. This feature, as well as the foregoing and other objects, will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein—

Figure 1 is an elevational view of a station selector constructed in accordance with the present invention and operatively connected to a series of variable condensers;

Figure 2 is a side elevational view of the construction shown in Figure 1;

Figure 3 is an enlarged sectional view taken substantially on the plane indicated by the line 3—3 of Figure 1;

Figure 4 is an enlarged sectional view taken substantially on the plane indicated by the line 4—4 of Figure 2; and

Figure 5 is a cross sectional view taken substantially on the plane indicated by the line 5—5 of Figure 4.

In general, the station selector comprises a revoluble shaft 10 having a 90° spiral 11 extending axially of the shaft and having the opposite edges forming opposed cam surfaces 12 and 13. One end of the shaft 10 is operatively connected to a shaft 14 by means of a coupling 15, and the shaft 14 is shown in Figure 1 as being common to the rotors 16 of a plurality of variable condensers adapted to be electrically connected in the usual way in a tuning circuit of a radio receiver to vary the capacitance of this circuit. In actual practice, the plates of each of the rotors 16 are secured to the shaft 14 in spaced relationship axially of the shaft, and these plates are moved relative to the stator plates 17 to vary the capacities of the condensers by the shaft 10.

Supported for movement toward and away from the spiral portion 11 of the shaft 10 in a plane including the axis of rotation of the latter shaft is a plurality of push button units 18. As will be more fully hereinafter set forth, the push button units are mounted for movement independently of each other toward the shaft 10, and each unit has a cam member 19 secured to the end thereof adjacent the shaft 10 for movement therewith. Each cam member 19 is provided with a cam surface 20 which extends transversely or tangentially of the spiral portion 11 of the shaft 10 and is adapted to alternatively frictionally engage the cam surfaces 12 and 13. Upon reference to Figure 3, it will be noted that the cam members 19 are in the form of semi-circular discs and are mounted on their respective push button units for adjustment independently of each other about an axis parallel to the axis of rotation of the shaft 10 to vary the angle of inclination of the cam surfaces 20 relative to the spiral portion 11 of the shaft 10.

The shaft 10 is normally maintained in the position thereof shown in Figure 2 relative to the cam members 19 on the push buttons by means of the weight 21 secured to the shaft and having sufficient mass to automatically return the shaft to a position wherein the condensers are in their zero positions. When the shaft 10 is in its inoperative position defined above, the push buttons 18 are, of course, in their retracted positions and the cam surfaces 20 on the cam members 19 are located with their forwardmost edges adjacent the cam surface 12 on the spiral portion 11 of the shaft. The angle of inclination of each

of the cam surfaces 20 with respect to the spiral portion 11 of the shaft 10 is accurately adjusted so that movement of any one of the push button units 18 toward the shaft 10 effects a rotation of the shaft throughout the number of degrees required to tune the radio receiving circuit to the wave length assigned to the particular push button operated. In other words, selective operation of the push buttons varies the capacity of the condensers through the shaft 10 to tune the radio receiving circuit to different predetermined wave lengths. As will be presently described, provision is made herein for latching each push button unit in its operative position wherein the surface 20 of the cam carried thereby is engaged with the spiral portion 11 of the shaft 10, and the latch for accomplishing this result is automatically released upon manipulation of any one of the other push button units. When, however, all of the push buttons are released, the weight 31 functions to rotate the shaft and associated rotors of the variable condensers to their zero positions.

It follows from the foregoing that each push button unit corresponds to a particular wave length and that the different number of wave lengths capable of being tuned depends upon the number of push buttons employed. Although six push button units are shown in the present illustrative embodiment of the invention, it will, of course, be understood that this number may be varied without departing from the spirit or scope of this invention.

Referring now more in detail to the particular construction of the station selector forming the subject matter of this invention, it will be noted that the push button units 18 are carried by a bracket 23 extending for substantially the full length of the shaft 10 and being channel-shaped in cross section. Upon reference to Figure 2, it will be noted that the inner flange 24 of the bracket is positioned adjacent the shaft 10 and that the latter is rotatably mounted at opposite ends thereof in strips 25 secured to the flange 24. The outer flange 26 of the bracket and the inner flange 24 is formed with a plurality of aligned slots 27 therethrough spaced from each other in the direction of the axis of the shaft 10 and slidably receiving the push button units to support the same for movement in directions toward and away from the shaft 10. It follows from the above that the push button units 18 and the condenser operating shaft 10 form an assembly capable of being installed as a unit in association with the radio receiving apparatus.

Each of the push button units 18 comprises a plunger 29 having a finger engaging button 30 at the outer end thereof and having an enlargement 31 located at the inner side of the flange 26. The inner end portion of the enlargement 31 telescopically engages in an extension 32 and the latter, in turn, extends through the adjacent slot 27 in the flange 24 of the bracket. The extension 32 has the cross sectional contour illustrated in Figure 5 and the side wall 34 is formed with a slot 35 therethrough in registration with an opening 36 formed in the inner end portion of the enlargement 31. A coil spring 37 is secured in the opening 36 under compression and is adapted to extend through the slot 35 to provide a yielding connection between the plunger 29 and extension 32. The arrangement is such that movement of the plunger 29 inwardly toward the shaft 10 effects a corresponding movement of the extension 32 through the medium of the spring 37. It will be understood as this description proceeds that the spring 37 cooperates with the latch holding the push button unit in its operative position to maintain the cam surface 20 on the cam 19 in frictional contact with the co-operating cam surface on the spiral portion 11 of the shaft 10.

The means for latching each of the push button units in a position wherein the cam surface 20 is in operative relation with the spiral portion 11 of the shaft 10 comprises a longitudinally extending plate 38 having the opposite end portions pivoted to the ends of the flange 26 laterally beyond the push button units and having the inner end 39 bent inwardly to successively engage in the notches 40 and 41. Suitable springs 42 are provided for the purpose of maintaining the inner edge portion 39 of the plate 38 into frictional engagement with each of the plungers 29 of the push button units. Upon reference to Figure 3, it will be noted that the inner edge 39 of the plate engages within the innermost notch 41 when the push button units are in their inoperative positions so that movement of the plungers 29 of these units to their innermost positions cams the plate 38 out of engagement with the notch 41 and causes the edge 39 of the plate to snap into engagement with the outermost notch 40 to hold the plungers against return movement under the action of the springs 43. In this connection, it will be noted that the inner ends of the springs 43 are respectively connected to the corresponding ends of the plungers 29 and the outer ends of the springs are anchored to the flange 26 of the bracket. The arrangement is such that the push button units are held in their operative positions by the plate 38 until the latter is moved out of engagement with the notches 40 against the action of the springs 42, whereupon the springs 43 operate to return the push button units to their inoperative position shown in Figure 3. If desired, suitable fabric or rubber washers 44 may be inserted between the inner end of the enlargement and the inner side of the flange 26 so as to avoid any noise that may result from engagement of the enlargement with the flange 26.

It will, of course, be understood from the above that the notches 41 in the enlargements 31 of the plungers are so arranged that they do not interfere with the return movement of the push button units to the position thereof shown in Figure 3. The purpose of the notches 41 is merely to cam the latch plate 38 out of engagement with one of the push button units upon manipulation of another of said units. In other words, only one of the push button units is operated at a time to tune the radio receiving circuit to the desired wave length, and this unit is automatically released upon manipulation of another unit to secure a different wave length.

Reference has been made above to the fact that the spring 37 associated with each push button unit serves the purpose of maintaining the associated cam surface 20 in frictional engagement with the spiral portion 11 of the shaft 10. In this connection, it will be noted that manipulation of any one of the push button units to effect an adjustment of the condensers by rotating the shaft 10 applies a counteracting force against the associated cam surface 20 in a direction away from the shaft 10. This force is absorbed by the spring 37 and, as a consequence, the latter functions to yieldably maintain the cam surface 20 in contact with the adjacent portion of the spiral.

The cam discs 19 are respectively adjustably

mounted upon their respective push button units to vary the angle of inclination of the cam surfaces 20 with respect to the spiral portion 11 of the shaft and thereby control the extent of rotative movement of the shaft by the respective cam members when they are moved by the push button units in directions toward the shaft. In detail, the inner end of each of the extensions 32 is return bent, as at 45, to receive a worm 46 maintained in the return bent portion 45 by means of a retainer plate 47 secured to the extension, as at 48. The worm 46 on each push button unit meshes with teeth 49 formed on the peripheral edge of the semi-circular cam member 19 carried by the same unit at the inner side of the worm. As stated above, the cam member 19 is pivotally supported on the extension 32 for rocking movement about an axis 50 located in a common plane with the axis of the shaft 10 and extending parallel to the latter axis. One end of each of the worms 46 is slotted, as at 51, to receive a suitable tool and by means of this tool, the worms may be rotated to effect an angular adjustment of the cam surfaces 20 with respect to the spiral portion 11 of the shaft 10.

Assuming that the condenser is in its zero position wherein the plates of the rotors are completely housed between the cooperating plates of the stators and that it is desired to vary the capacity of the condensers, it will be noted that the operator merely presses the push button unit corresponding to the particular wave length of the station he desires to receive. Movement of this selected push button unit in a direction toward the shaft 10 engages the cam surface 20 of this unit with the cam surface 12 of the spiral portion 11 of the shaft 10 and effects a rotation of this shaft throughout a number of degrees depending upon the angular adjustment of the cam surface 20 with respect to the cam surface 12 on the spiral. Inasmuch as the shaft 10 is directly coupled to the condenser shaft 14, it follows that the rotors of the condensers are moved throughout a corresponding degree of angular travel from the zero position thereof to decrease the capacity of the condensers. Assuming that the operator now desires to secure a station which requires an increase in capacity of the condensers, it will be noted that movement of the selected push button unit toward the shaft 10 engages the cam surface 20 of this unit with the cam surface 13 of the spiral to rotate the shaft 10 and condenser shaft 14 in the opposite direction. As stated above, initial manipulation of the second push button unit releases the latch plate 38 from the first mentioned push button unit and permits the latter to return to its inoperative position under the action of the spring 43. In this connection, attention is called to the fact that the cam surface 20 acts upon the cam surface 12 of the spiral portion 11 whenever the adjustment of the variable condensers requires a decrease in capacity and acts upon the opposite cam surface 13 when it is desired to increase the capacity of the condensers.

Provision is made herein for actuating the variable condensers independently of the push button units to vary the capacities of these condensers. As shown in Figure 1, a beveled gear 55 is secured to the shaft 10 and meshes with a beveled pinion 56 secured to the inner end of a shaft 57 slidably mounted in the flanges 24 and 26 of the bracket 23. In the outermost position of the shaft 57, the pinion is free from the gear 55 and is held in this position during tuning of the variable condensers by the push button units so that the latter need not overcome the resistance offered by the auxiliary tuning unit when adjusting the shaft 10. The shaft 57 is normally maintained in its inoperative position by means of a spring 58 surrounding the shaft with one end engaging the outer side of the flange 24 and the other end engaging a washer 59 secured to the shaft 57. Movement of the shaft to its inoperative position by the spring 58 is limited by means of a second washer 60 held against a shoulder on the shaft by a spring 61 and engageable with the inner surface of the flange 24. The shaft 57 is held in its innermost position wherein the pinion 56 meshes with the gear 55 by means of an enlargement 62 on the shaft having a shoulder 63 adapted to be engaged by the latch plate 38 previously described as also functioning to hold the push button units in their operative positions. A suitable control knob 64 is secured to the extreme outer end of the shaft in a position where it may be conveniently manipulated by the operator.

With the above construction, it will be noted that manipulation of any one of the switch button units will have the effect of automatically releasing the auxiliary control for the condensers since the pinion 56 is held into mesh with the gear 55 by the latch plate 38 which is, of course, released from the enlargement 62 when any one of the push button units is actuated.

What we claim as our invention is:

1. In a station selector for radio receiving apparatus, the combination with a variable condenser having a rotor shaft, of a positionable member coupled to the rotor shaft and having a cam surface extending in the direction of the axis thereof, a plurality of control members supported for movement independently of each other toward the positionable member, a cam member carried by the end of each control member adjacent the positionable member and each of said cam members having a cam surface engageable with the cam surface on the positionable member upon selectively moving the control members toward the positionable member to rotate the latter and rotor shaft throughout different predetermined degrees of angular travel, means for yieldably resisting movement of the control members toward the positionable member, and latch means for maintaining the cam of each control in engagement with the cam surface on the positionable member against the action of the yieldable means and releasable upon movement of any one of the other control members in a direction toward the positionable member.

2. In a station selector for radio receiving apparatus, the combination with a variable condenser having stator blades and rotor blades movable relative to the stator blades, of a rotor shaft operatively connected to the rotor blades and having a spiral portion extending in the general direction of the axis of the shaft providing opposed cam surfaces, a plurality of controls supported for movement independently of each other toward said surfaces, and a cam member mounted on the end of each control adjacent said spiral portion and each cam member having a cam surface alternatively engageable with the cam surfaces of the spiral upon selectively moving the control members in a direction toward said spiral portion to rotate the latter in opposite directions throughout different predetermined degrees of angular travel.

3. In a station selector for radio receiving ap-

paratus, the combination with a variable condenser having stator and rotor blades movable relative to the stator blades, of a rotor shaft operatively connected to the rotor blades and having a connecting member having opposed cam surfaces extending in the general direction of the axis of the rotor shaft, a plurality of control members supported for movement independently of each other in a direction radially of the axis of the connecting member, a cam member mounted on the end of each control member adjacent said connecting member and each cam member having a cam surface extending toward the cam surfaces on said connecting member and alternatively engageable with the cam surfaces thereof upon selectively moving the control members in a direction toward said connecting member to rotate the latter in opposite directions throughout different predetermined degrees of angular travel, and means effective upon movement of any one of the control members toward said connecting member to yieldably maintain the cam surface of the associated cam member in frictional engagement with the adjacent cam surface on said connecting member.

4. In a station selector for a radio receiving apparatus, the combination with a variable condenser having stator blades and cooperating rotor blades movable relative to the stator blades, of a rotor shaft operatively connected to the rotor blades to move the latter relative to the stator blades and having a cam surface extending in the general direction of the axis of said shaft, a plurality of control members supported for movement independently of each other transversely of the shaft, means carried by the control members and effective upon selectively moving the members toward said shaft to engage the cam surface on said shaft and rotate the latter throughout different predetermined degrees of angular travel, said means comprising a cam segment pivotally mounted on the end of each control for swinging movement on an axis parallel to the axis of the shaft and having a straight edge portion disconnectedly engageable with the cam surface on the shaft, and an adjustable screw mounted on each control and engageable with teeth formed on the arcuate surface of the cam segment to vary the angular relationship between the straight edge portion of the cam and the cam surface on the shaft.

5. In an automatic tuning device, in combination with mechanism to be tuned, a positionable member connected to said mechanism for rotating the same, and mounted for rotation about an axis, a plunger member movable longitudinally in a direction transverse to said axis, a positioning member pivoted on said plunger for contacting and moving said positionable member, and means for locking said positioning member in a selected angular relationship on said plunger.

6. In a radio station selector, in combination with a tuning device, a frame, a manual for moving the tuning device to a predetermined position, said manual being slidably mounted in said frame, an actuating member at the inner end of said manual, the said actuating member being rotatably mounted on said manual for adjustment, the said member having two actuating parts spaced on opposite sides of the rotational axis thereof, and an adjusting screw carried by said manual for adjusting the said actuating member about its said axis.

7. In automatic tuning apparatus a mechanism to be tuned, a member movable on an axis to tune said mechanism, a plunger movable longitudinally transversely to and in a direction through said axis, and means on said plunger for positioning said member by first moving said member in one direction about its axis and then stopping said member in a predetermined position by contact therewith on the other side of the axis of said member, said means on said plunger being adjustable with relation thereto for varying the position to which said plunger moves said member.

8. In an automatic tuning device, a casing, a member pivoted to turn about an axis in said casing, a series of plungers slidably mounted in said casing for longitudinal movement in a direction transverse to and thru said axis, and adjustable means on said plungers for swinging said member to predetermined angular positions.

9. In a radio station selector, in combination with a tuning device, a frame, a manual for moving the tuning device to a predetermined position, said manual being slidably mounted in said frame, an actuating member at the inner end of said manual, said actuating member being rotatably mounted on said manual for adjustment, the said member having two actuating parts spaced on opposite sides of the rotational axis thereof and means carried by said manual for adjusting the said actuating member about its axis.

10. In an automatic tuning device, in combination with a mechanism to be tuned, a member pivoted to turn about an axis, a connection between said member and said mechanism, a plunger longitudinally movable transversely to said axis, and means on said plunger for swinging said member to a determined angular position when said means is brought against said member, said means being adjustable with respect to said plunger.

11. In an automatic tuning device, in combination with a mechanism to be tuned, an elongated member pivoted to turn about its longitudinal axis, a connection between said member and said mechanism, a plurality of plungers each longitudinally movable toward said axis and means on each of said plungers for swinging said member to a determined angular position when said means is brought against said member.

12. In an automatic tuning device, in combination with a mechanism to be tuned, an elongated member pivoted to turn about its longitudinal axis, a connection between said member and said mechanism, a plurality of plungers each longitudinally movable toward said axis and means on each of said plungers for swinging said member to a determined angular position when said means is brought against said member, each of said plungers having resilient means for urging it out of contact with said elongated member.

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